

## Tutorial session 2: Running FLoSC

***FLoSC***

Forecasting Length of Stay and Cost

*Health and Social Care Modelling Group  
University of Westminster, London*

# Outline

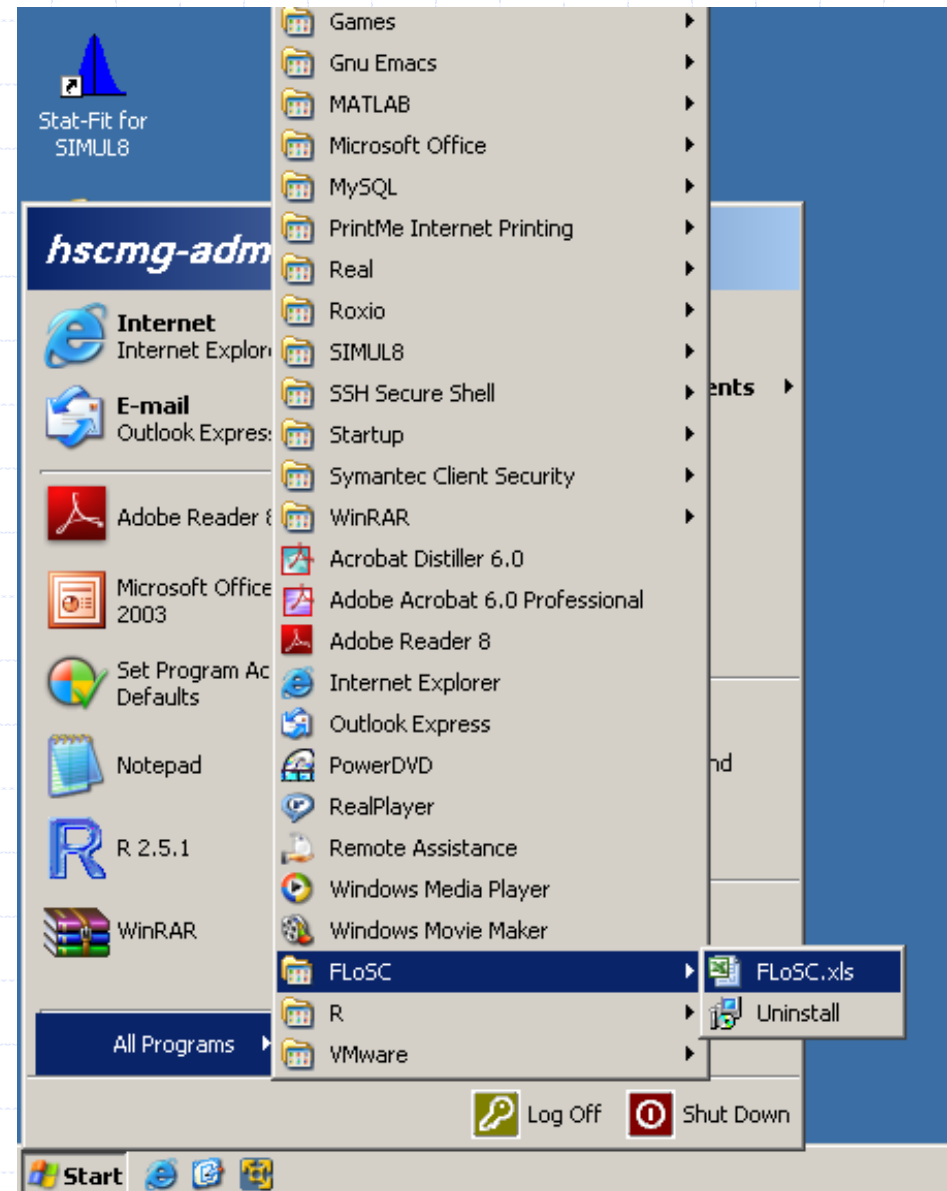
- ◆ How to start FLoSC?
- ◆ How to get data?
- ◆ How to use FLoSC?
- ◆ Results



**How to start FLoSC?**

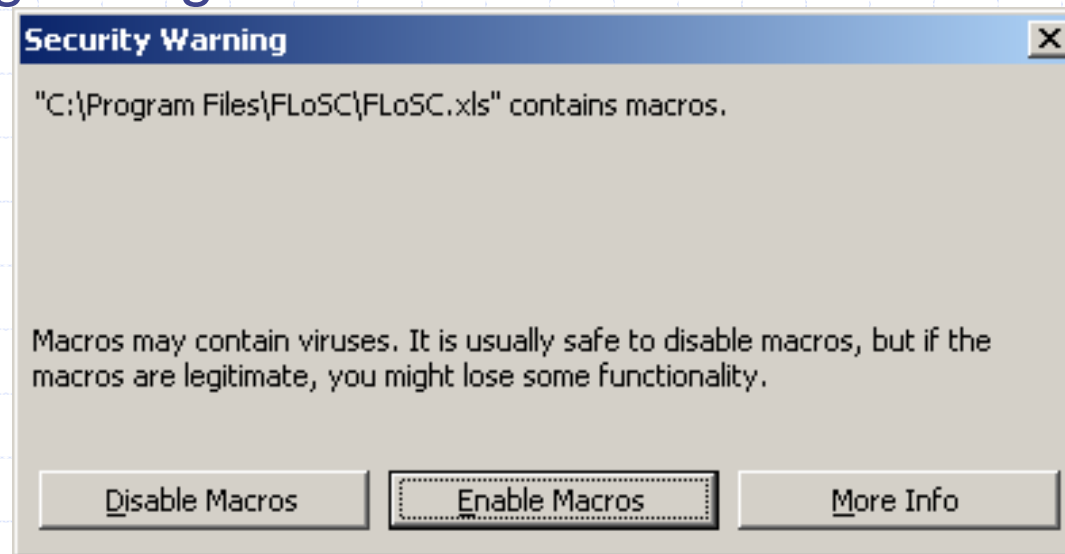
## How to start FLoSC?

- ◆ Start FLoSC from the Start menu (“FLoSC.xls”)



## How to start FLoSC?

- ◆ FLoSC is implemented as an Excel file.
- ◆ When starting FLoSC, you will be presented with the following dialogue window.

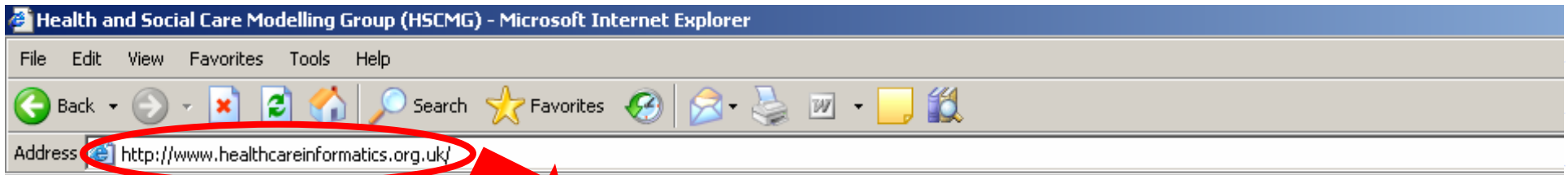


- ◆ Click “Enable Macros” to allow FLoSC to run.





**How to get data?**



University of Westminster

<http://www.healthcareinformatics.org.uk>

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The **Health and Social Care Modelling Group (HSCMG)** is a cross campus interdisciplinary group, with expertise in medicine, healthcare, operational research and statistics, based at the Cavendish School of Computer Science of the University of Westminster.

The HSCMG traces its origins back in 1994 with MSc Decision Sciences project placements at St George's Hospital Medical School. The HSCMG works in close collaboration with organisations in the health and social care sector and has developed strengths in the area of quantitative modelling of the process and management of care and in the development and application of modelling techniques for planning and managing health and social care systems.

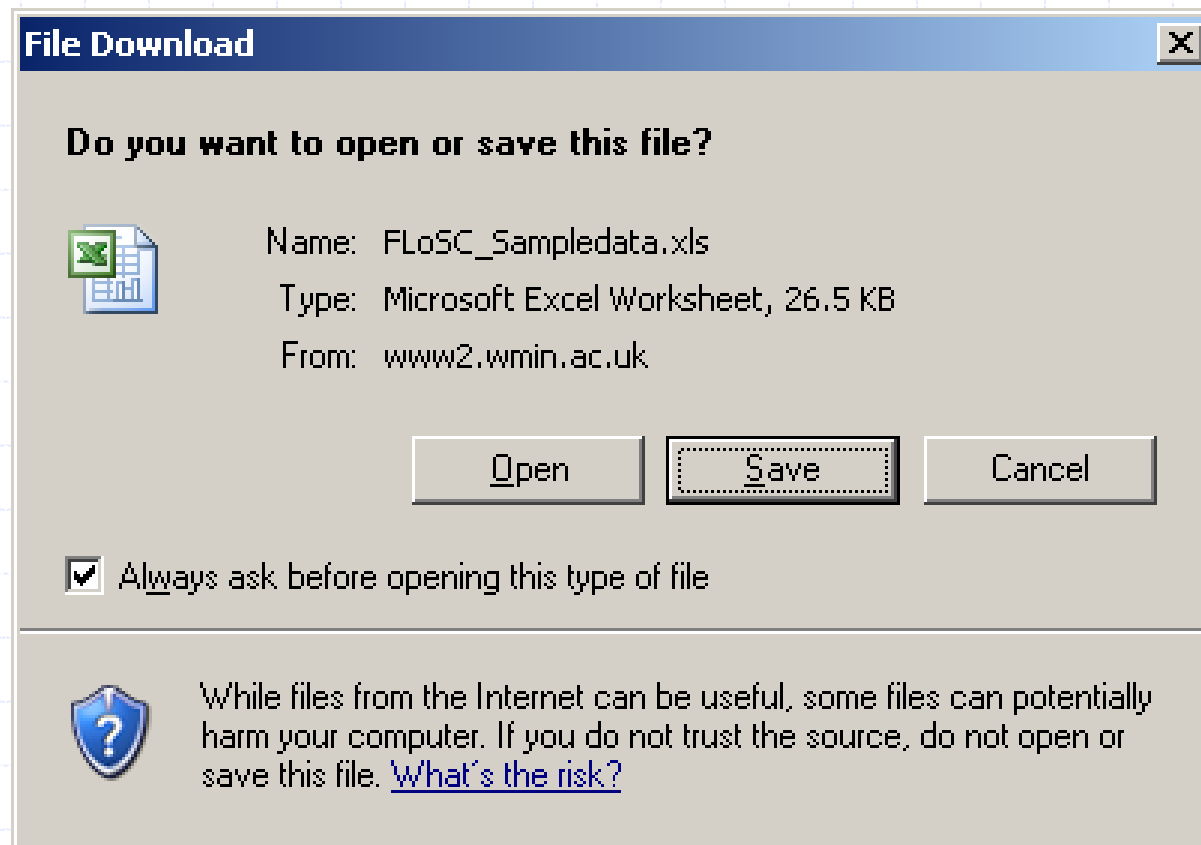
### What's New

- **Forecasting Length of Stay and Cost**  
([FLoSC](#))
- **To download FLoSC Tutorial Data ...**  
[Click here](#)
- **To download FLoSC Sample Data ...**  
[Click here](#)



# How to get data?

- ◆ Save the data file on the desktop



# How to get data?

- ◆ Select and copy data from the excel file “FLoSC\_Sampled ata.xls”

The screenshot shows a Microsoft Excel spreadsheet titled "FLoSC\_Sampledata.xls". The data is organized in a table with the following columns: id, gender, type\_of\_caplos, los, and end\_reason. The rows contain numerical data for each of these categories.

	A	B	C	D	E	F	G	H
1	id	gender	type_of_caplos	los	end_reason			
2	300	1	1	0	244	3		
3	1024	0	2	598	659	3		
4	1259	0	1	148	108	3		
5	1822	0	1	0	796	-1		
6	2777	0	2	99	215	3		
7	3332	0	1	0	157	-1		
8	5042	0	1	1696	997	3		
9	8074	0	2	0	868	-1		
10	8832	0	2	0	364	-1		
11	9039	0	1	0	34	3		
12	9227	1	1	272	285	3		
13	9229	0	1	427	472	3		
14	10046	0	2	0	646	3		
15	10488	0	1	0	487	-2		
16	10729	0	2	0	1066	3		
17	11339	1	2	384	1637	-1		
18	11827	0	1	0	77	3		
19	14205	1	1	1637	107	3		
20	14262	0	2	0	1345	3		
21	14535	1	1	0	99	2		
22	14535	1	2	0	201	-1		
23	17099	1	2	0	68	3		
24	18567	0	1	0	698	-1		
25	18925	0	1	0	577	3		
26	19138	0	2	0	139	-1		

# How to get data?

- ◆ Paste the selected data into FLoSC
- ◆ Delete any previous data if necessary
- ◆ Verify the heading and the order of the columns

Microsoft Excel - FLoSC.xls

File Edit View Insert Format Tools Data Window REExcel Help Adobe PDF

A2 fx 300

	A	B	C	D	E	F	G	H	I
1	id	gender	type of care	plos	los	end reason			
2	300	1	1	0	244	3	Run FLoSC		
3	1024	0	2	598	659	3			
4	1259	0	1	148	108	3			
5	1822	0	1	0	796	-1			
6	2777	0	2	99	215	3			
7	3332	0	1	0	157	-1			
8	5042	0	1	1696	997	3			
9	8074	0	2	0	868	-1			
10	8832	0	2	0	364	-1			
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13	9229	0	1	427	472	3			
14	10046	0	2	0	646	3			
15	10488	0	1	0	487	-2			
16	10729	0	2	0	1066	3			
17	11339	1	2	384	1637	-1			
18	11827	0	1	0	77	3			
19	14205	1	1	1637	107	3			
20	14262	0	2	0	1345	3			
21	14535	1	1	0	99	2			
22	14535	1	2	0	201	-1			
23	17099	1	2	0	68	3			
24	18567	0	1	0	698	-1			
25	18925	0	1	0	577	3			
26	19138	0	2	0	139	-1			
27	20831	0	2	0	1273	3			



**How to use FLoSC?**

# How to use FLoSC?

- ◆ Click on the “Run FLoSC” button

The screenshot shows a Microsoft Excel spreadsheet titled 'Microsoft Excel - FLoSC.xls'. The spreadsheet contains a table with 27 rows and 7 columns. The columns are labeled 'id', 'gender', 'type of care', 'plos', 'los', and 'end reason'. The 'Run FLoSC' button is located in cell G2, circled in red, with a red arrow pointing to it from the right. The formula bar shows 'A2' and 'fx 300'.

	A	B	C	D	E	F	G	H	I
1	id	gender	type of care	plos	los	end reason			
2	300	1	1	0	244	3	Run FLoSC		
3	1024	0	2	598	659	3			
4	1259	0	1	148	108	3			
5	1822	0	1	0	796	-1			
6	2777	0	2	99	215	3			
7	3332	0	1	0	157	-1			
8	5042	0	1	1696	997	3			
9	8074	0	2	0	868	-1			
10	8832	0	2	0	364	-1			
11	9039	0	1	0	34	3			
12	9227	1	1	272	285	3			
13	9229	0	1	427	472	3			
14	10046	0	2	0	646	3			
15	10488	0	1	0	487	-2			
16	10729	0	2	0	1066	3			
17	11339	1	2	384	1637	-1			
18	11827	0	1	0	77	3			
19	14205	1	1	1637	107	3			
20	14262	0	2	0	1345	3			
21	14535	1	1	0	99	2			
22	14535	1	2	0	201	-1			
23	17099	1	2	0	68	3			
24	18567	0	1	0	698	-1			
25	18925	0	1	0	577	3			
26	19138	0	2	0	139	-1			
27	20831	0	2	0	1273	3			

## How to use FLoSC?



- ◆ Click “Next” to continue

**FLoSC - Forecasting Length of Stay and Cost**

This toolkit is developed by the Health and Social Care Modelling Group (HSCMG) of the University of Westminster for the Care Services Efficiency Delivery (CSED) programme of the Department of Health.

User guides together with tutorials can be accessed at:  
<http://www.healthcareinformatics.org.uk/flosc>

Disclaimer: This toolkit is provided to assist local authorities with their planning of social care. It should be noted that the results obtained will be dependent on the completeness, accuracy and validity of the input data. Past patterns of LOS may change as a result of council actions or extraneous factors. Councils will need to make their own judgements on the credibility of the forecasts. Risks and opportunities should be identified and demand should be monitored to detect changes in trends.

**HSCMG**  University of Westminster  Department of Health

Care Services Efficiency Delivery

Exit < Prev **Next >**

## How to use FLoSC?

- ◆ Specify the start and end date of the data availability period.
  - In this case, it is from 20/10/2003 to 15/04/2008.
  - Click on the drop-down arrow and a calendar will appear.

FLoSC - Forecasting Length of Stay and Cost

Please specify the start and end of the data availability period

From 20/10/2003

To 15/04/2008

October 2003

Mon	Tue	Wed	Thu	Fri	Sat	Sun
29	30	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	1	2
3	4	5	6	7	8	9

Today: 11/04/2008

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## How to use FLoSC?

- ◆ Specify the start and end date of the data availability period.
- ◆ Once the dates are set, click “Next” to continue.

**FLoSC - Forecasting Length of Stay and Cost**

Please specify the start and end of the data availability period

From

To

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# How to use FLoSC?

- ◆ All the available data will be used for analysis
  - Select “all available data”
- ◆ Click “Next” to continue

**FLoSC - Forecasting Length of Stay and Cost**

Please specify the data to perform the analysis

All available data

Subset of the data

Gender

Both

Male

Female

Type of care

Both

Residential Care

Nursing Care

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# How to use FLoSC?

- ◆ Select “Automatic model selection”
- ◆ Click “Next” to continue

**FLoSC - Forecasting Length of Stay and Cost**

Please specify the model structure

Automatic model selection (Recommended)

Manual specification

Residential Care

One state

Two states

Nursing Care

One state

Two states

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Exit < Prev Next >

## How to use FLoSC?

- ◆ Select “Yes” to produce cost forecast for known commitment on 15/04/2008
- ◆ Click “Next” to continue

**FLoSC - Forecasting Length of Stay and Cost**

Is forecast for known commitment to be performed?

Yes

No

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# How to use FLoSC?

- ◆ Specify the forecast period
  - Select “+1 financial year”
- ◆ Specify the time interval to forecast
  - Select “quarterly”

FLoSC - Forecasting Length of Stay and Cost

Please specify the time period to forecast

+1 financial year

Please specify the time interval to forecast

6 monthly

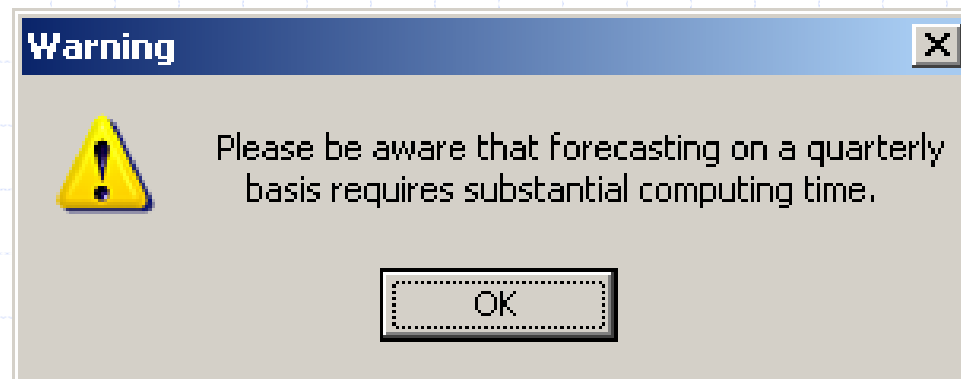
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Exit < Prev Next >

## How to use FLoSC?

- ◆ A dialogue box appear
- ◆ Select “OK”



# How to use FLoSC?

- ◆ Click “Next” to continue

The screenshot shows a software window titled "FLoSC - Forecasting Length of Stay and Cost". The window contains two dropdown menus for forecasting parameters. The first dropdown is labeled "Please specify the time period to forecast" and is set to "+1 financial year". The second dropdown is labeled "Please specify the time interval to forecast" and is set to "quarterly". The HSCMG logo is visible in the bottom left corner of the window. At the bottom of the window, there are three buttons: "Exit", "< Prev", and "Next >".

**FLoSC - Forecasting Length of Stay and Cost**

Please specify the time period to forecast

+1 financial year

Please specify the time interval to forecast

quarterly

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Exit < Prev Next >

# How to use FLoSC?

- ◆ Type in the dedicated boxes the weekly price for RC and NC for the 2 financial years covered by the forecast period
- ◆ Click “Next” to continue

	Residential Care	Nursing Care
Current financial year	400	500
+1 year	450	600
+2 year		
+3 year		
+4 year		
+5 year		

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Exit < Prev Next >

# How to use FLoSC?

- ◆ Click “Run” to start the model fitting and forecasting

**FLoSC - Forecasting Length of Stay and Cost**

Below is a summary of the model specification

Data availability period from 20/10/2003 to 15/04/2008

Data subset criterion:  
-- Gender: both  
-- Type of care: both

Model selection mode: automatic

Perform forecast for known commitment: yes  
--Forecast period: +1 financial year  
--Forecast interval: quarterly

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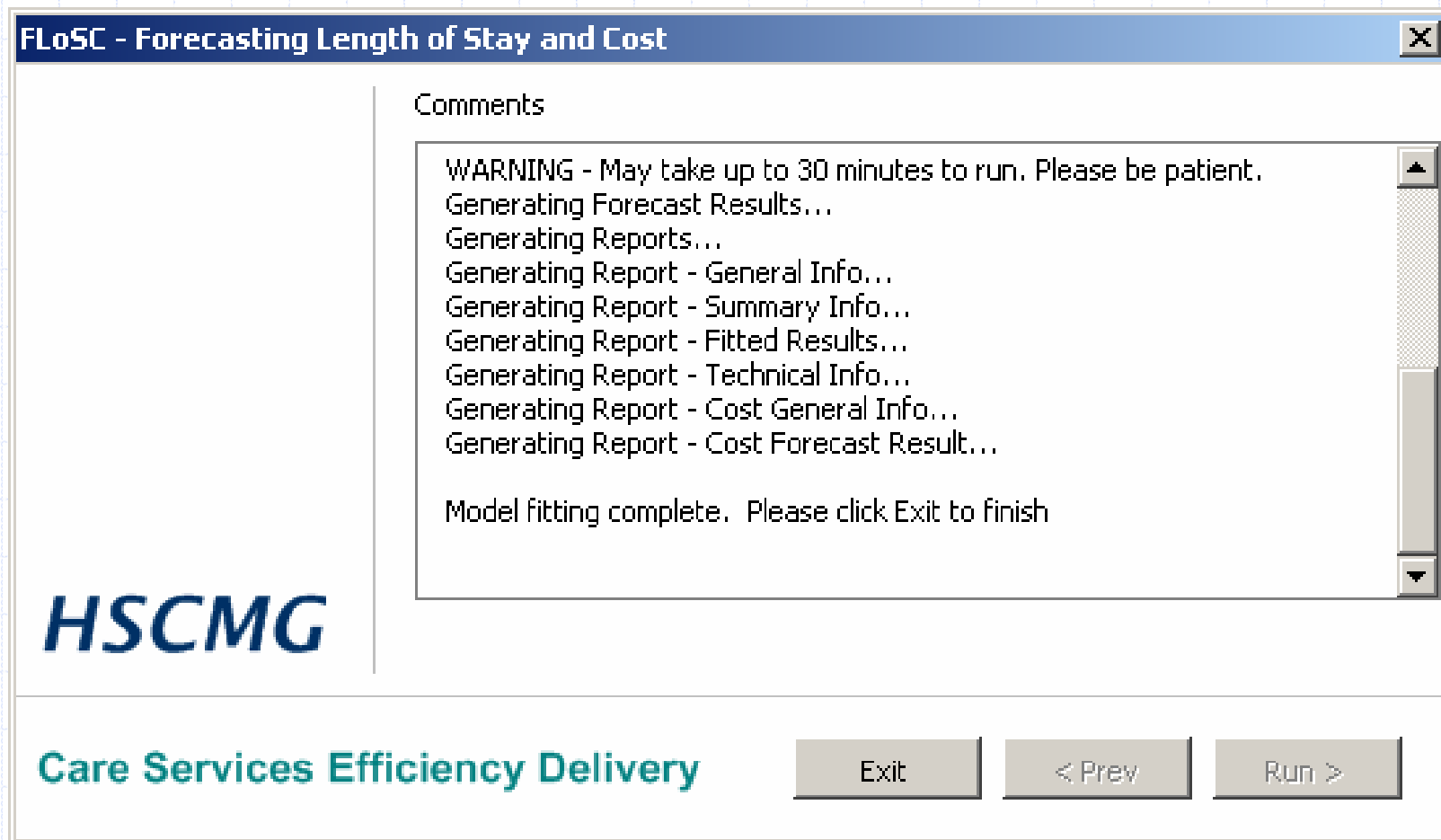
Please click Run to proceed to model fitting

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Exit    < Prev    Run >

# How to use FLoSC?

- ◆ Click “Exit” to finish





**Results**

Microsoft Excel - FLoSC.xls

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Type a question for help

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1											
2	<b>Report: Length-of-stay Analysis</b>										
3											
4	This analysis was carried out on 2008-04-11 at 16:18:08										
5											
6	<b>General information</b>										
7	number of records										221
8	period covered	between 2003-10-20 and 2008-04-15									
9											
10	<b>Data cleaning and data processing</b>										
11	data subset criterion	gender = both ; type of care = both									
12	number of record(s) deleted due to movement from NC to RC										3
13	number of record(s) in the working dataset										218
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Report - LOS - General Info | Report - LOS - Summary Info | Report - LOS - Fitted Results | Report - Cost - General Info | Report - Cost - Forecast Result | Rept

Draw AutoShapes

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## Summary information on the working dataset

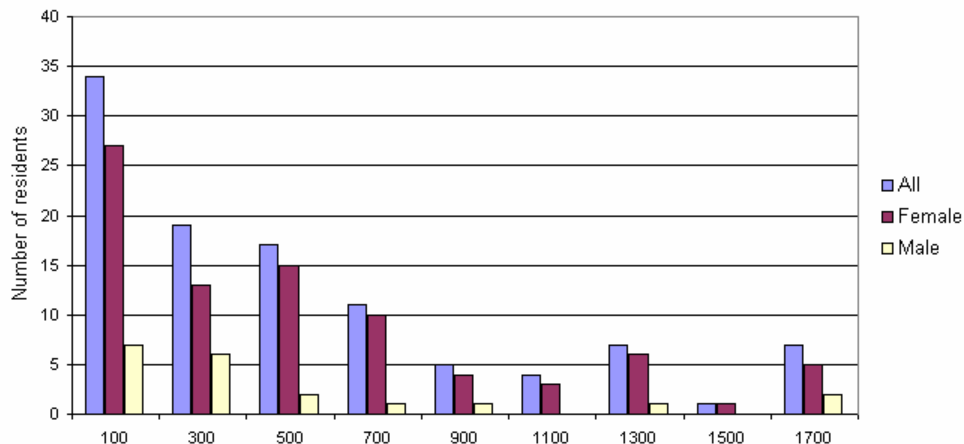
### Frequency table (by gender)

	RC	NC	Total
female	84	83	167
male	20	30	50
missing	1	0	1
total	105	113	218

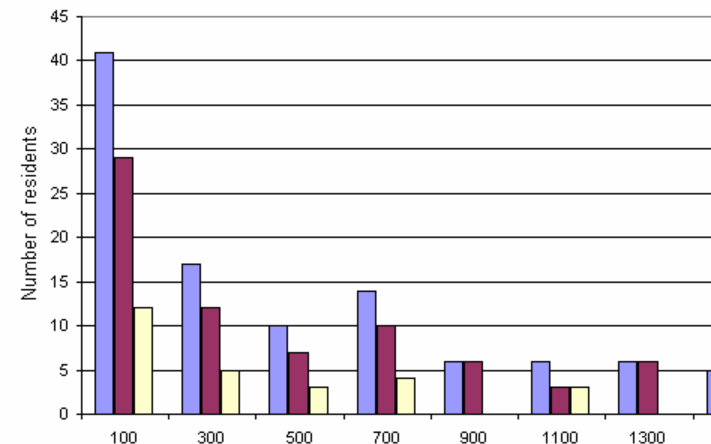
### Summary statistics on length of stay

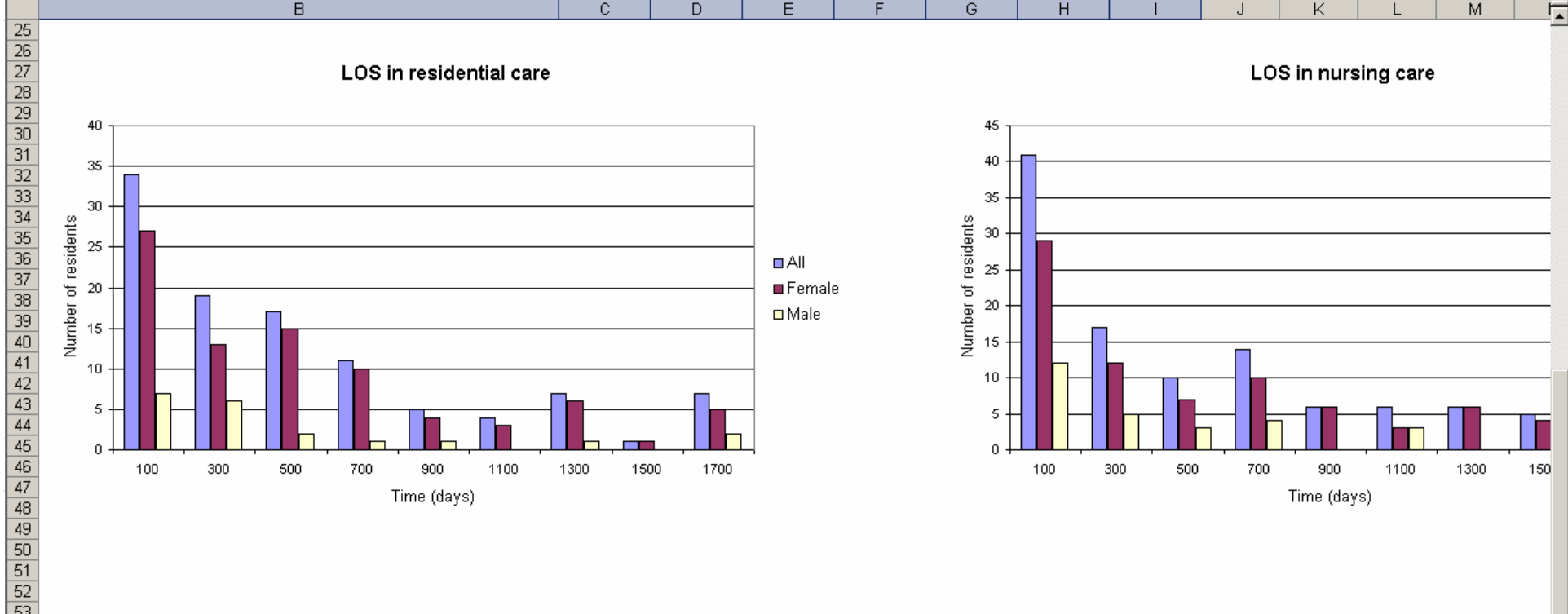
	count	mean	stdev	Q1	median	Q3	skewness
All RC residents	105	905.2	907.1	247	588	1361	1.709
All NC residents	113	747.5	716.5	169	596	1145	1.199
All female residents in RC	84	878.8	841.5	253.8	592	1333.8	1.43
All male residents in RC	20	1009.4	1181.3	240.8	559.5	1390.8	1.782
All female residents in NC	83	753	706.7	171	598	1129.5	1.048
All male residents in NC	30	732.2	755.1	173.5	574	1084.5	1.487
All residents with missing gender in RC	1	1041	NA	1041	1041	1041	NA
All residents with missing gender in NC	0	NA	NA				NA

LOS in residential care



LOS in nursing care





**Summary on the movement of residents**

55	total number of residents present on 2003-10-20	84
56	---- in RC	46
57	---- in NC	38
58	number of admissions to RC during the period	59
59	number of residents died in RC during the period	54
60	number of residents transferred to NC during the period	25
61	number of residents still living in RC at the end of the period	24
62	number of direct admissions to NC during the period	50
63	number of residents still living in NC at the end of the period (including those transferred from RC)	40
64	number of residents died in NC at the end of the period (including those transferred from RC)	73
65	number of residents died in NC at the end of the period (among those transferred from RC)	8
66	number of residents still living in NC at the end of the period (among those transferred from RC)	17

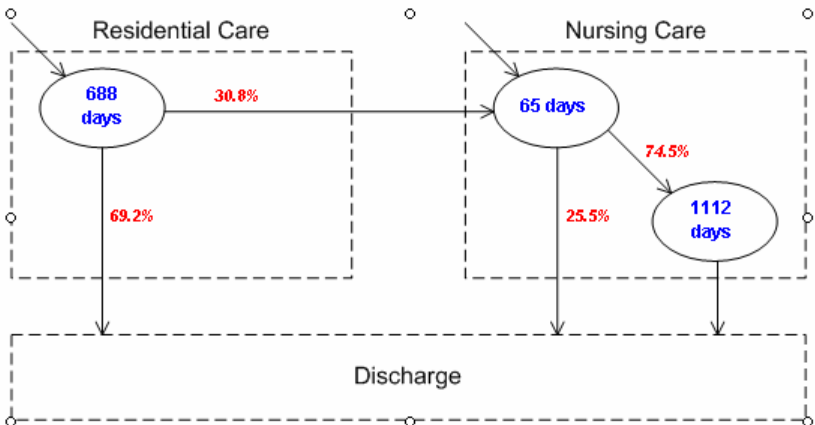
## Model fitted results

### Model structure

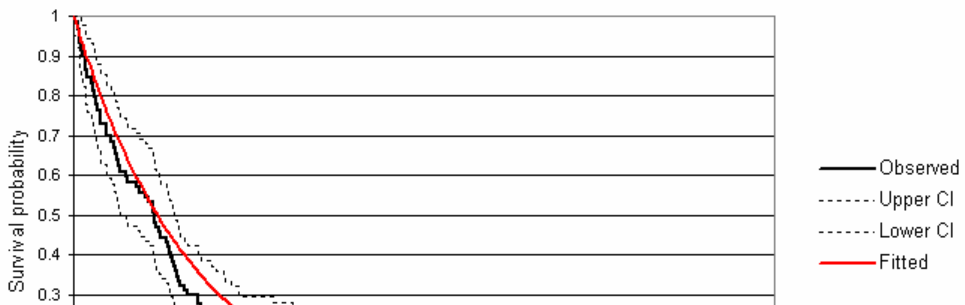
RC	1 state
NC	2 states

model selection mode: automatic

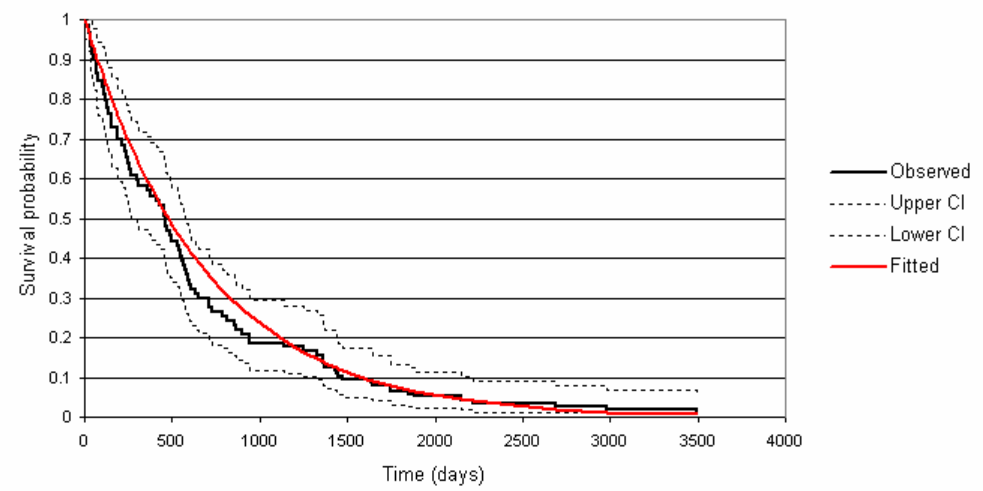
### Residents' movements and patterns of LOS



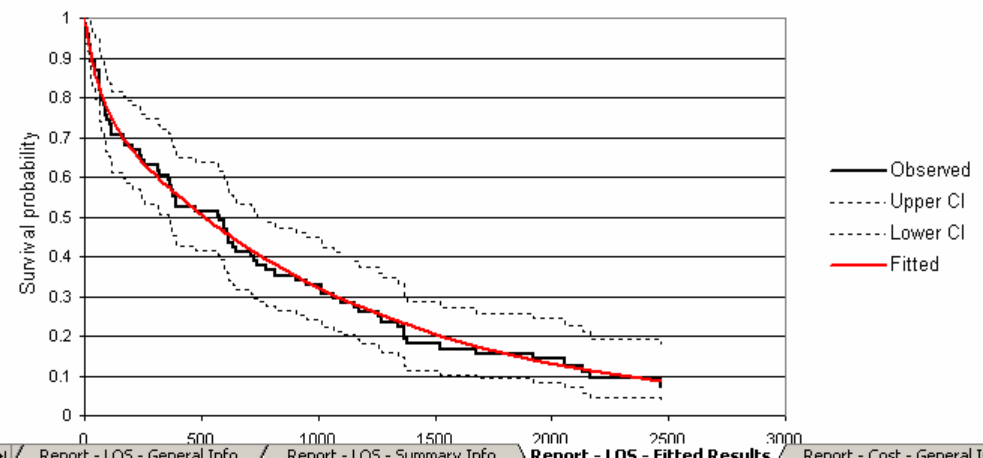
### Survival curve for residential care



Survival curve for residential care



Survival curve for nursing care



Microsoft Excel - FloSC.xls

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Type a question for help

A1

**Report: Cost Forecast - Summary Information**

This analysis was carried out on 2008-04-11 at 16:18:38

**Summary information on known commitment**

number of residents in system on 2008-04-15	64
data subset criterion	gender = both ; type of care = both
number of residents in working dataset	64
--- in RC	24
--- in NC	40

**Frequency table (by gender)**

	RC	NC	Total
female	18	30	48
male	5	10	15
missing	1	0	1
total	24	40	64

**Summary statistics on length of stay**

	count	mean	stdev	Q1	median	Q3	skewness
All RC residents	24	1237.5	1161.4	345.8	975	1680	1.287
All NC residents	40	972.8	832.6	269	716.5	1246.5	0.991
All female residents in RC	18	1048.8	820.7	386.2	852.5	1609.2	0.703
All male residents in RC	5	1956	2019.5	185	1370	3450	0.267
All female residents in NC	30	928	794.1	297.8	716.5	1223.2	0.914
All male residents in NC	10	1107.4	972.3	318.8	924	1462	0.888
All residents with missing gender in RC	1	1041	NA	1041	1041	1041	NA
All residents with missing gender in NC	0	NA	NA				NA

Report - LOS - General Info | Report - LOS - Summary Info | Report - LOS - Fitted Results | **Report - Cost - General Info** | Report - Cost - Forecast Result | Rept

## Report: Cost Forecast - Forecasted Costs Due to Known Commitment

Forecasting period: from 2008-04-15 to 2010-04-01 year(s)  
 Forecasting interval: quarterly

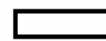
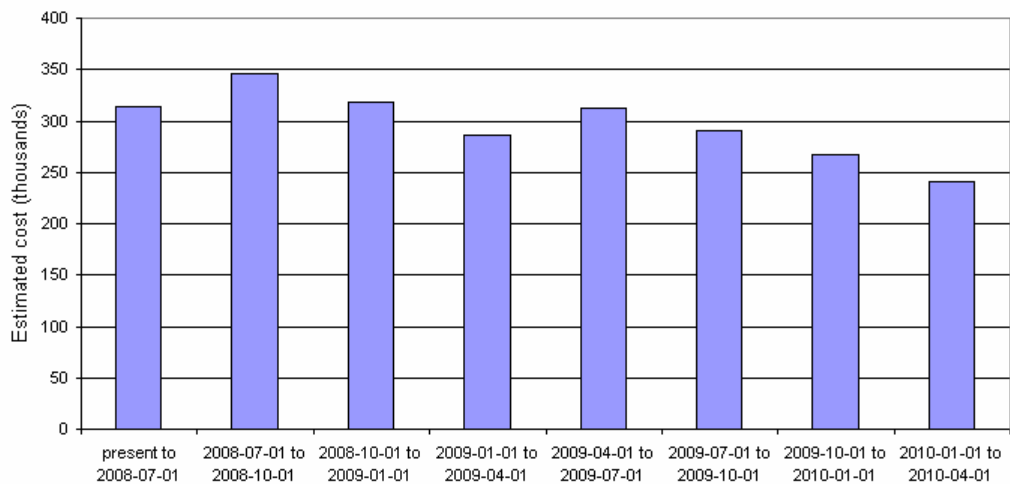
### Weekly cost of care

Financial year	RC	NC
2008/09	400	500
2009/10	450	600

### Projected total cost of current commitment

Financial period	Total cost
present to 2008-07-01	313859
2008-07-01 to 2008-10-01	346202
2008-10-01 to 2009-01-01	317606
2009-01-01 to 2009-04-01	285405
2009-04-01 to 2009-07-01	313043
2009-07-01 to 2009-10-01	290914
2009-10-01 to 2010-01-01	267311
2010-01-01 to 2010-04-01	240522

Estimated cost



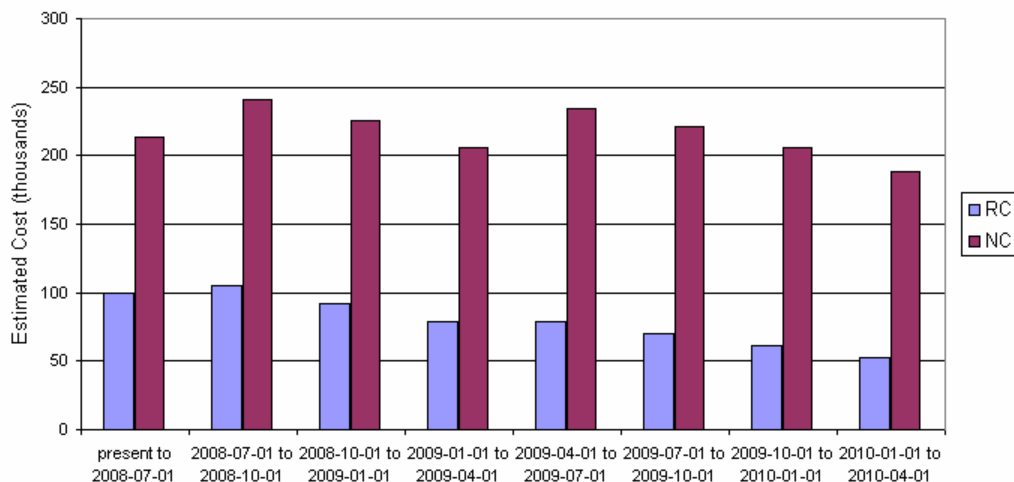
49  
50

**Break-down of the projected total cost by type of care**

Financial period	RC	NC
present to 2008-07-01	99917	213941
2008-07-01 to 2008-10-01	105638	240563
2008-10-01 to 2009-01-01	92445	225160
2009-01-01 to 2009-04-01	79254	206151
2009-04-01 to 2009-07-01	79065	233978
2009-07-01 to 2009-10-01	70003	220910
2009-10-01 to 2010-01-01	61261	206050
2010-01-01 to 2010-04-01	52519	188002

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**Estimated cost by type of care**



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Microsoft Excel - FLoSC.xls

File Edit View Insert Format Tools Data Window RExcel Help Adobe PDF

Type a question for help

A1

parameter	estimate	s.e.	ciL	ciU
q {12}	0.000448	0.00009	0.000302	0.000663
q {23}	0.011407	0.00576	0.004238	0.030705
q {14}	0.001005	0.00013	0.000773	0.001306
q {24}	0.003906	0.00135	0.001981	0.007704
q {34}	0.0009	0.00013	0.000671	0.001206

**Fitted survivor function**

RC  $\exp(-0.00145*x)$

NC  $0.209*\exp(-0.0153*x) + 0.791*\exp(-0.0009*x)$

**Fitted transfer probability from RC to NC**

transfer prob 0.308

Report - LOS - Summary Info / Report - LOS - Fitted Results / Report - Cost - General Info / Report - Cost - Forecast Result / **Report - LOS - Technical Info**